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MINISTRY OF WORKS & URBAN DEVELOPMENT
ETHIOPIAN ROADS AUTHORITY

Ethiopia Road Sector Development Stage IV Project
(APL4)
In Support of Govt.'s RSDP (P106872)

Re-Disclosure
of
Executive Summary of
Environmental Impact Assessment
Reports
For

1. Mekenajo-Dembí Dolo Road Upgrading Project
2. Welkíte-Hosáina Road Upgrading Project
3. Ankober-Awasharba Road Construction Project

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Table of Contents

T A B L E O F C O N T E N T S	XIV
PART I – MEKENAJO-DEMBI DOLO LINK ROAD PROJECT.....	1
PART II – WELKITE-HOSAINA LINK ROAD PROJECT.....	12
PART III – ANKOBER-AWASHARBA LINK ROAD PROJECT.....	24

Part I – Mekenajo-Dembi Dolo Link Road Project

E.1 Introduction

Mekenajo - Dembidolo Road project is located in the West Wollega Zone of the Oromia Regional State. The proposed road route traverses eight woredas of the zone namely: Ayira Guliso, Gawo Dale, Gimbi, Hawa Walel, Lalo Assabi , Seyo, Dale Sedi and Yubdo woredas, and it connects town centers and several villages of those woredas. The project route map is shown in Fig 1.1. The project is among the road project works planned by the Ethiopian Roads Authority (ERA) for the transport sector development.

The Ethiopian Road Authority has secured fund from IDA for the implementation of the project. ERA commissioned SPANS Consultants in association with Beza- Consultants to undertake review of the feasibility study, review of the Environmental Impact Assessment (EIA), review of the detailed engineering design and tender document preparation of the Mekenajo – Dembidolo Road project.

The Environmental Impact Assessment review has been conducted in accordance with the requirements of the Terms of Reference (TOR).

The EA report prepared in June 2003 has been revised and updated to reflect the current situation of the project area. This EIA report, therefore, represents the revised version of the previous report.

E.2 Existing Road and Environment

The existing road is a gravel surfaced RR-50 standard road. The width of the existing road ranges from 4.92 to 6.15 meters. The road starts from the town center of Mekenajo (km 0+000) and ends at the town center of Dembidolo (180+596). The road pavement along the project road is severely damaged at some places. During the field visit extensive pavement deterioration was observed at stations 8+100 – 9+200, 86+000 – 96+600, 113+100 – 136+800, and 139+800 – 145+700, where comfort speed was poor to very poor at 40Km/h.

The road project falls in the West Wollega zone, in the Western part of the Oromia National Regional State. West Wollega zone lies between 8°12'N and 10° 03'N latitudes and 34° 08' E and 36° 10' E longitudes – and is characterized by physiographic features of mountain, undulating and rolling plateaus, and gorges ranging from 500 to 3200masl.

Western Oromia Sub region on the other hand extends from 07° 13'16" to 10° 20'10"N latitude and 34° 08'30" to 37° 40'53"E longitude. The Altitude of the sub region ranges from 500masl up to over 3000masl.

E.2.1 Biological & Physical Environment

The road route traverses mainly mountainous and rolling topographic land forms, with smaller section of flat terrain. The project road follows a ridge in the initial part of the road up to km 30+000. The first 20 km part of the road is saddled with sharp curves and erosion gullies. The road traverses escarpment section from km 33 up to Ayira town. From Ayira to the end of the project most of the terrain is mountainous and rolling sections.

West Wollega zone is one of the densely vegetation covered areas of the country. The area is covered with forests and tree crops including coffee and fruit trees. The Climatic Climax Vegetation (i.e. the vegetation that would develop in the absence of human interference, only by the natural environmental conditions) of the zone includes; broad leafed forest, grasslands and wetlands/marshlands. Broad leafed forest trees are found almost in all districts of the zone including those traversed by the project road. The influence area of road route is mainly dominated by Aningeria species and Olea species. Grasslands consisting of different species cover limited areas in

the drier south and south western areas while wetlands/marshlands are localized in the central western part of the zone.

There are significant wildlife habitats in the West Wellega zone including the woredas traversed by the road project. The common wild life of the zone include Lion, Buffalo, Hippopotamus, otter, Civet, Bushbuck, Roan Antelope, Leopard, striped hyena, Columbus monkey, Patas monkey, hamadryads, baboon and Klipspringer.

West Wollega Zone has rich mineral resources including ferrous mineral and precious metals like gold and platinum. The precambrian era rocks are sources for the ferrous, none –ferrous and the precious metals, while the Cenozoic era sedimentary rocks are sources of the iron and coal. The mineral of the zone consists of coal, iron, nickel, precious metals (Gold and Platinum), non-ferrous minerals (Cobalt, molybdenum, titanium, Uranium and phosphate), and industrial and construction mineral like marble. Some of the localities with high mineral deposits fall with in the influence area of the road project; this includes Yubdo, Gimbi, Dembidolo, Guliso – Hena.

E.2.2 Water Resources and Wetland / Marshland Areas

West Wollega Zone has high water resource potential both surface and sub surface water resources. Most of the rivers of the zone are perennial, and there are also seasonal streams. Ground water source is shallow with depths ranging up to 100m. The eastern and south eastern part of the zone, also constituting the districts traversed by the road project has pocket areas of unconsolidated alluvium aquifer with high productivity yield and unconsolidated sediments forming low productivity aquifer.

Wetlands/marshlands generally support a wide range of biotical, hydrological, and physical processes which result in ecosystem function and the provision of valuable goods or services. The wetland/marshland and flood plains in the woredas traversed by the road are used as grazing grounds especially during the dry weather periods of the area and also for crop harvest in the dry seasons. Almost all the woredas have such marshland areas, though the plot areas differ from woreda to woreda. The total area of wetland/marshland in those woredas is estimated at 3000 hectare.

There are however very limited wetland/marshland areas along the Project Road route. The wetland/marshland sites in the project area are those seasonally water inundated plain lands along the river banks traversed by the road. There is no extended wetland/marshland area specially designated as protected site/ conservation site. The identified small/limited wetland/marshland areas along the road route are found around km 37, 98, 126 and 170 mainly along river courses. All these wetlands/marshlands are relatively small in size but have useful ecological functions.

E.2.3 National Parks and Protected Areas

There is no designated national park. There are a number of potential protected areas, such as wildlife reserve and conservation areas available in West Wellega zone and the Western Oromia is endowed with forest and water resources forming areas potentially rich in wildlife conservation. However, according to site investigations by the consultant and also as confirmed by the Oromia Environmental Protection Office (re-confirmed in January 2009), there is neither park nor protected conservation site along the road route and in the proximity of the road project site. All of the designated protected areas and conservation worthy sites are very far from the project influence areas. The road project works, both for the main activities of road construction and for the ancillary works neither touch nor will be located in any one of those physical resource sites as they are at far distance from the route corridor.

There is plot of planted forest land (mainly juniper us trees) from station 16 + 900km up to station 19 +000km. along the road route, which is used as recreational site for those residing in the area.

E.2.4 Historical and Cultural Heritages

According to the Atlas of west Oromia, Historical and cultural resources in the West Oromia Sub Region include: Palaces of Aba Jiffar & Kumssa Moroda, Mosques of Aba Jiffar and residential houses. Places of worship like traditional mosques, monasteries and churches are found in the sub region. Among the traditional places the Beluke in Wellega and the Sida Abachagi in Illubabor are the prominent ones. At these sites, the ancient holy trees of faith of the Oromo people are displayed. As confirmed by the Oromia Environmental Protection Bureau in January 2009, and as observed at site by the EIA consultant, there are no recorded historical, cultural and archeological heritage sites with in the project influence area and in the right – of – way of the road route. This fact was also confirmed by the consultation results made with the woreda administrations and elderly people of the project area, and during the site visits and site investigation.

However, there are churches, mosques, Odas and burial places that fall within the road project influence areas but out of the ROW of the road. There may also be unexplored archeological findings that may encounter upon excavation works – though known religious and sacred places, cemeteries and monuments of the area are away from the road alignment. There is always possibility to yield undiscovered cultural artifacts, and any cultural and archeological resources encountered should be reported to the local (woreda) Environmental Protection Office and/or the woreda culture and tourism desk and arrangements are made as to how the PCR is protected and conserved either on site or relocated as the case may be.

Mitigation measures or avoidance for the archeological / cultural heritages if encountered will be accomplished as per the requirements of the available legal frame work “Proclamation No.209/2000”, a proclamation to provide for research and conservation of cultural heritage.

This proclamation describes the management of cultural heritages under Part two of the document. Some of the issues discussed include; Owner of cultural heritage, establishment of museums, classification of cultural heritage, registration of cultural heritage, duties of owners of cultural heritage, conservation and restoration of cultural heritage, preservation of cultural heritage, removal of cultural heritage etc.

Part four of the proclamation discusses on reserved areas, Inspection, duty to cooperate and penalty. Under this part it is indicated that unless it has been decided by the council of ministers, no person may, without a permit issued by the authority, carry out building or road construction, excavations of any type or any operation that may cause ground disturbance in an area declared reserved. However, this is not triggered by he project as there is no such reserved PCR sites in the road route corridor.

Accordingly;

- Protection and preservation requirements for Cultural heritages, Archeological sites and aesthetics of Landscape shall be specified in the construction contract documents for contractors. The contractor will abide to the requirements of Proclamation No.209/2000.
- The contractor should consult the responsible bureau in the area in cases of findings of such properties on the site before removal and damage.
- Damages to locally significant sites like religious places, funeral places, grave yards, Holly trees (Oda), Holly springs shall be avoided by alternative routes, as sites of quarry and borrow pit, access and detour roads or as material storage site.

Any archeological findings encountered up on excavation shall be reported immediately to the concerned bureau or department to register and guide the conservation and protection of such a heritage

The woreda environmental office and woreda culture and tourism desks should be informed upon mobilization of the construction activities and also be involved in the site environmental management

and monitoring processes. ERA through its assigned supervising consultant should liaison with the woreda administration to involve them and seek their assistances at all levels of the environmental conservation and in monitoring of the implementation of mitigation measures. The contractor is also instructed to liaison with the woreda administration as required and to cooperate in considering their concerns and guidance in agreement and after approval by the supervising consultant.

The woreda environmental/ natural resource conservation desks have to be capacitated and trained on environmental management and monitoring activities. The project may consider a short term training of the experts in each woreda traversed by the road project. The ERA's ESMB has the capacity to organize and conduct such short term training in collaboration with the project consultant and with the Oromia Region Environmental Protection Office.

E.2.5 Population, Ethnic and Religious Groups

As per the information contained in Statistical Abstract, 2004 (Central Statistical Agency), total population (July 2005) of eight woredas constituting the influence area of the project road is estimated as of July 2005 at 977,710 (Males – 481,967 and Female - 495,743). The major ethnic groups of the woredas in the influence area are Oromo (85%), Amahara (9.1%), Guragea (1.3%) and others constitute the remaining 4.6%. The main languages include Oromifa, Amarigna, Gedeogna and Guragigna. The religious groups in the project woredas constitute orthodox Christian, Musilim, Protestant Christians. Percentage distribution of different ethnic and religious groups in the project influence area (PIA) is given Table 4.3.

A map showing the major features of the environment is shown in **Fig 1.2**

E.3 Objectives of the Environmental Impact Assessment

The overall objectives of this EIA-study is to update the previous EA report (June 2003) to reflect the detailed design of the project road in order to ensure that environmental issues and concerns are duly considered and incorporate in the planning and implementation of the road project. Accordingly, the study identifies environmental components that are likely to be significantly affected by the road project implementation and proposes mitigation measures that would avoid and/or minimize adverse impacts and to enhance the positive ones.

E.4 Methodology of the EIA study

The environmental impact assessment process followed data collection both from primary sources and secondary sources. Identification and analyses of significant environmental issues is made on the bases of those data. Baseline data collection was done through field investigation, consultation with stakeholders and from previous study documents.

E.5 Proposed Project and Activities

The total length of the road would be 181 km and width of 7-meters asphalt surfaced carriageway, with 1.5 m gravel shoulders on either side. The road project starts at Mekenajo town (km 0+000) which is located 456 km from Addis Ababa on the Addis Ababa-Nekemte- Assosa highway, and traverses south up to Dembidolo town (km 180+596).

The major activity of the road project is an upgrading of the existing gravel surfaced road (the width between 4.92 to 6.15 m.) to asphalt surface road (carriageway 7m asphalt surface. and gravel shoulder 1.5 m on both sides, except for two short realignment town sections, 8.8 km in total to improve access to nearby town centers: Ayra and GebaRobi towns whereby following the existing cart path and urban town roads that are currently located at some distances from the existing gravel paved road alignment (ref. Fig. 1.3). However, the realigned section traverses through unpaved

ground and farmlands, partly through vegetation covered and animal grazing grounds and partly through cultivable farmlands, and no significant environmental impact is anticipated.

The construction work activities include site clearing, excavation and grading, filling, compacting, waterways and wetland/marshland crossing, paving, use of heavy machinery, quarry and borrow material development, establishing camps, temporary detour roads construction and maintenance. Other ancillary works like quarry site development, temporary access road and detour road construction, etc. shall also be executed in the project area.

E.6 Policy, Legal and Administrative Framework

Policies, legal and administrative provisions relevant to environmental issues and sustainable development are briefly discussed to highlight the working environment under which the project implementation operates in Ethiopia. The extant policy and regulatory framework in Ethiopia is adequate to address the environmental concerns arising from the implementation of development projects road sub-sector. Although the institutional set up at the federal level (i.e. Environmental Protection Authority, Ethiopian Roads Authority and its Environmental Monitoring & Safety Branch, etc) is well equipped with experienced professionals, however, they need to have proper logistical support for efficient supervision and monitoring.

At the regional state level, there is an Environmental Protection Office of Oromia, which is mandated to handle environmental conservation and protection issues within the region. It is being organized to capacitate itself in accomplishing its responsibilities.

Applicable World Bank safeguarded policies (OP/BP 4.01 Environmental Assessment, OP/BP4.11 Physical Cultural Resources and OP/BP 4.12 (Involuntary Resettlement) are also applied and complied with that are expected to be triggered by the project road.

These policies and guidelines are the bases to implement the Environmental Management and Monitoring Plans as discussed in the following sections.

E.7 Project Alternative

Analyses of project alternatives considered three major parameters;

Alternative Road Surfacing Standads: as alternatives, High gravel, Asphalt Surface Treatment and concrete asphalt surfacing materials have been compared from aspects and socio-economic analysis.

Alternative Routes: Alternative route analyses compare the need for diversions and new alignments to access some of the town centers: Ayira and Geba Robi) that are located at some distances away from the existing road alignment. Otherwise, the proposed road maintains the existing alignment all through the lengths of the road. The socio-economic and environmental impacts in combination with the results of the user community consultation has been analyzed in order to recommend the most appropriate option.

Alternative of the Road Upgrading Project Vs the No Project Scenario: this alternative discusses the situation with out the road condition improvement (i.e. the existing road as it is) with that of asphalt surfaced standard road. This is evaluated both from socio-economic as well as environmental perspectives.

E.8 Environmental Impact Analyses

Analyses are conducted with a view to identifying the environmental component that would likely to be affected by the road project i.e. the Valued Environmental Components.

The resulting impacts are categorized as positive or beneficial and negative or adverse impacts. Positive impacts are mainly related to the social and economic benefits that would be attained due to the road condition improvements, while the adverse impacts are mainly related to the relocation of people and loss of properties, disturbance and degradation of the natural bio-physical environment on the other hand.

- **Impact on Flora:** Major impacts to the vegetation cover would be caused during the construction phase of the project. Attention should be given to especially the new alignment sections (Ayra and Geba Robi) where there is undisturbed vegetation cover,
- **Impact on Fauna:** There are no major wild life habitat like parks and sanctuaries that fall in the right – of - way of the road project, and no endangered wildlife species reported in the area. However, common wildlife population like apes, monkey, hyena etc. and different birds species are found in the route corridor,
- **Impact on Wetlands/Marshland:** The road construction and operation will have a limited impact on the wetland/marshland along the road route at km 37, 98, 126 and 170. It can affect the flow pattern of surface runoff by concentrating flow at certain points, which can contribute to flooding and erosion effects in the area, undermine the natural water movement and impair the biological cycle and productivity of the wetland/marshland.
- **Impact of Construction Materials Development and Operation:** The specific location of construction material sites is not known upfront, but will later on be identified by the contractor. Excavation and removal of the material result in disturbances of the natural landscape, the vegetation cover, the fertile top soil. Excess or spoil soil left over if not appropriately treated may be washed away in to the near by streams and cause siltation of the water body.
- **Impact on Land Use:** Loss of agricultural land or grazing land can occur either temporarily or permanently. The road upgrading follows mainly an existing old road alignment and the impact on land use will be limited – however is substantial for the realigned sections.
- **Impact on Public Health:** The area is malaria affected zone and stagnant water that accumulates on excavated grounds, abandoned quarry and borrow development sites, excavated side road ditches and ponds may create favorable condition for mosquito breeding. In addition sexually communicable diseases including HIV/ AIDs may be an issue due to the migrant work force.
- **Impact on Physical and Cultural Resources:** As confirmed by the Oromia Regional State Bureau of Tourism and Culture in January 2009, there is no recorded significant Cultural or historical heritage comparable to that of palaces and unique worship sites recognized at national or regional level along the road right of way that might be affected during construction. However, there are churches, mosques, Odas and burial places that fall within the road project influence areas, and there may be unexplored archeological findings that may encounter upon excavation works.

E.9 Mitigation Measures

The engineering design attempts to avoid environmental components that are likely to be affected adversely by the project activities. However, adverse impacts that can not be avoided would be minimized through implementation of appropriate mitigation measures. Accordingly, mitigation measures and mitigation management plans are proposed. The adverse environmental impacts that result due to the paved road route would be minimal.

The influence area of road route is mainly dominated by *Aningeria* species and *Olea* species. Grasslands consisting of different species cover limited areas in the drier south and south western areas while wetlands/marshlands are localized in the central western part of the zone.

Illegal hunting and poaching in to the wildlife areas be prohibited and supervised both by the project implementers and the local administrative structure. In addition regular awareness program to the

work force and local suppliers will be implemented. Traffic regulations shall be put in place and traffic posts at critical locations be implemented to minimize accidents to wild life.

Major impacts at wetland/marshland, though limited, would be dealt with by providing necessary culverts to allow free flow on natural water, and also, during the construction period, necessary awareness will be provided to vehicular/construction equipment operations to maintain necessary vehicle maintenance to avoid potential oils leakage of these equipment on construction site – in order to minimize the potential risk of contamination of wetland/marshland along the project site.

The quarry/production area has to be screened determined in consultation/approval of the supervision consultant and ERA ESMB whereby sufficient consultation should be conducted with the local administrations prior to commencing excavation activity to limit the area of disturbance. The left over spoil soil should be collected and kept aside for rehabilitation of the site at later stage of the work. Spoil soil should be shaped and compacted to avoid erosion and leakage to the river banks, water bodies or on dense vegetation covered ground. Upon completion of the use of the production/quarry site, it should be rehabilitated and restored to a reasonable degree to its original state so as to avoid water ponds, soil erosion, aesthetically undesirable situations and disfigured landscape. Back filling, grading and re-vegetation of the site would help to mitigate the impact. Based on the site condition simple soil retaining structures and run off water diversion structures might be required to stabilize the soil structure and reduce the effect of soil erosion until it consolidates.

Based on the Social Impact assessment (SIA) findings that identify the number of persons to be affected by the subject project, Resettlement Action Plan (RAP) has been prepared.

Protection and preservation requirements for Cultural heritages, Archeological sites and aesthetics of Landscape shall be specified in the construction documents for contractors, and training on awareness of the PCR will be provided to the site workforce. This include the provision of short term training for excavators on PCR artifact recognition, and rapid response system will be set up for PCR findings with concerned authorities.

It is required that the contractor should timely rehabilitate the excavated grounds as soon as site work is completed, maintain sanitary conditions in camp sites and work places and provision of sanitation facilities to the workers, avoid any stagnant water and unsanitary ground to avoid mosquito and vector breeding.

The design documents, contract documents and specifications prepared for this project require the contractor/s to take necessary protective measures to minimize potential impacts and will be closely supervised by supervising engineers (the environmental inspector & resident engineer) and ERA's Environmental Monitoring and Safety Branch (EMSB). The woreda environment office/ natural resources desk will also be involved in the site environmental management process as required and provide technical support and indicate the concerns of the local administration and the community.

E.10 Environmental Management Plan

Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures responsible bodies for the various actions are summarized as part of the EIA, which should be closely monitored and supervised by ERA ESMB have been out-lined in the above sections. Implementations of these measures have to be carried out at different stages of road construction & operation phases.

The EMP should set bases for environmental clauses to be included in contract document for contractors. The environmental clauses will emanate from he mitigation measures outlined.

The woreda environmental offices/ natural resources conservation desks will participate in the site environmental management and monitoring processes and reflect the concerns of the local community and that of the woreda administration.

E.11 Environmental Monitoring Plan

Environmental monitoring shall be conducted with the following major objectives:

- a) To ensure the proper implementation of the mitigation measures in line with the EIA proposal (compliance monitoring)
- b) To compare the environmental conditions and changes of the project area after project implementation with that of pre - project situation (Effects monitoring).

The monitoring exercise shall be carried out by qualified experts and institutionally organized body. The training and capacity building needs have been identified and recommendations are included along with the necessary budget.

The contractor should comply with terms and conditions specified in the contract document. None compliance to any of the environmental clauses and mitigation management plan should be monitored regularly and reported to the resident engineer, who will take timely action to rectify. The contractor is subject to penalty for none compliance.

The form of penalty might be either withholding the payments of contractor against the volume of work delayed, or to refrain from approval of other site works before the rectification is done as specified. Whatever the conditions, either of the above preconditions will allow the contractors to abide them to the contractual document.

E.12 Costs of Environmental Mitigation and Monitoring Plan

Major Costs related to environmental enhancement measures that require physical construction works are estimated and included in the engineering design and tender/contract documents. Compensation for properties lost and relocation of PAPs is included in RAP report. Apart from the cost of relocation/ compensation and the costs already included in the engineering cost estimate, the cost of environmental mitigation measures under this report is estimated at Birr 5,577,000. These measures include: bio-engineering measures, training of environmental experts and awareness creation programs on STD and HIV/AIDs, cost for environmental inspectors, for supervision and monitoring activities.

E.13 Base Map Preparation

Thematic base map has been prepared using the appropriate GIS (Geographic information Systems). The Road route location, road route ROW and influence area, woredas and towns traversed, sensitive ecosystem component etc. are indicated on the map.

E.14 Conclusion and Recommendations

The woredas traversed by the road are among the areas with potential rich natural resources including cash crops like coffee and mineral resources like gold and platinum. They have high potential for investment and trade development.

On the other hand, social services are inadequate and transport facility is inefficient and under developed. The implementation of the road project would have significant positive impacts to the social-economic development of the area in particular and to that of the country in general. The resulting adverse impacts can be mitigated through implementation of measures as identified in the EIA report.

Adverse impacts due to the project would be minimal, as the construction activities follow the existing road alignment for the major part of its length (except for 8.8 km) at two town sections. The potential major adverse impacts would result along these realigned town sections to improve access to the nearby towns which requires a number of trees and houses and trees to be removed and relocated. The compensation and resettlement of the affected group should be cautiously handled.

FIGURE 1.1 : PROJECT LOCATION MAP

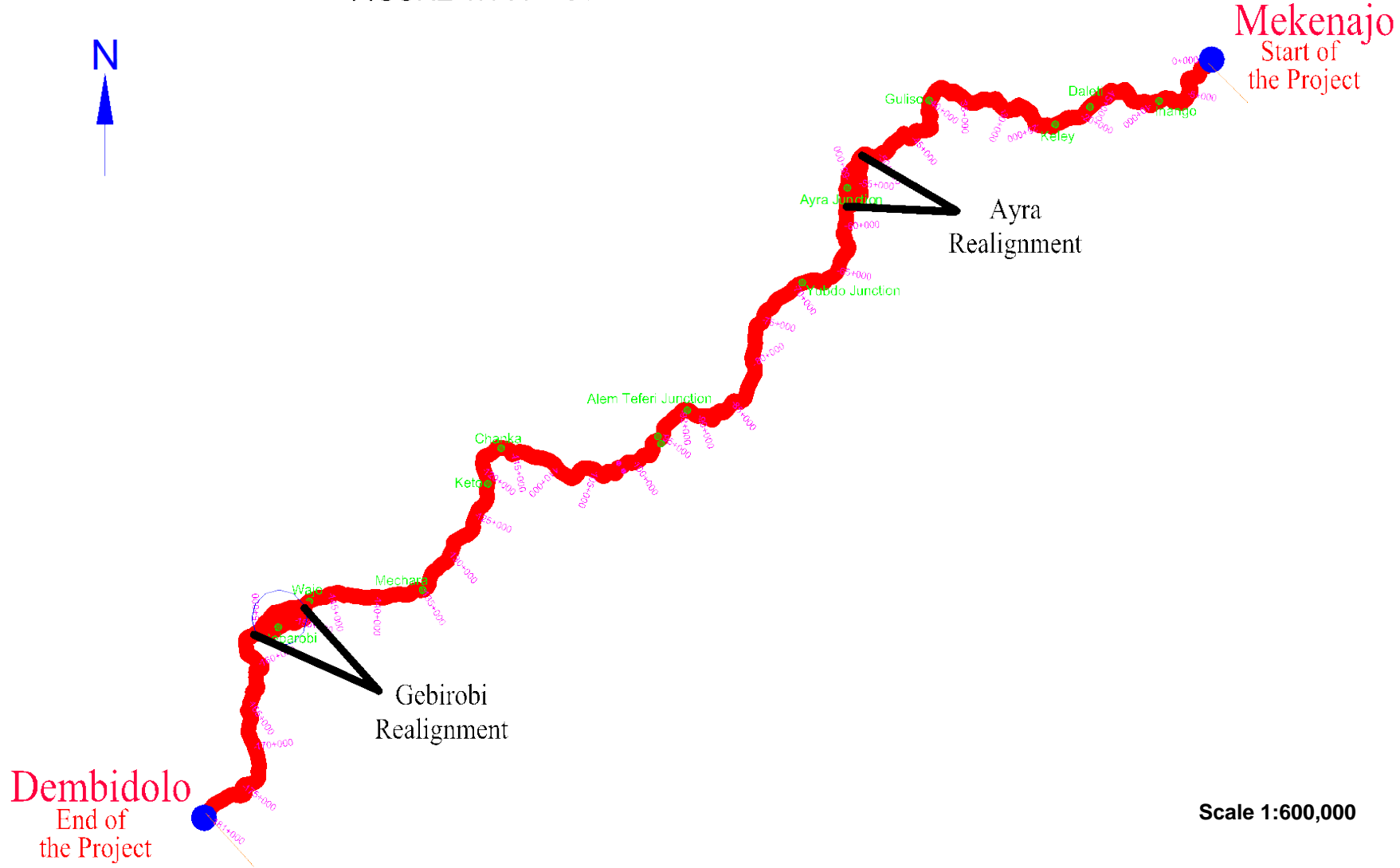
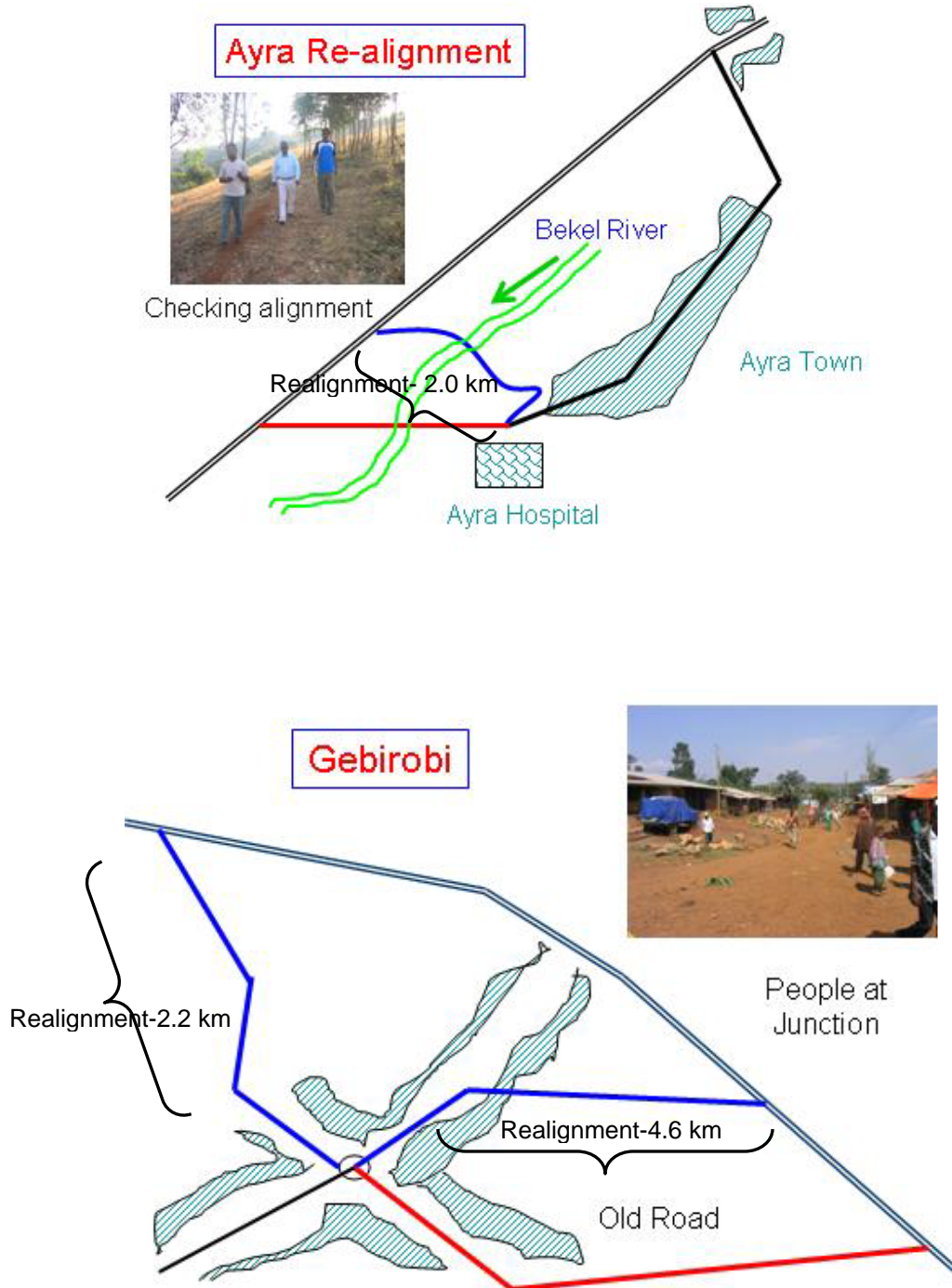


Fig 1.3 Realigned Town Sections



Part II – Welkite-Hosaina Link Road Project

1. Introduction

The Wolkite – Hosaina Road project lies in the Southern Nations Nationalities and People’s Region(SNNPR) of Ethiopia and will connect three Zones of the region namely; Gurage, Silte and Hadiya zones. The road project starts at a junction on the Addis Ababa – Jimma Asphalt road just within the Municipal area of Wolkite town and ends at Hossana town of Hadiya Zone. Wolkite town is found about 158 km from Addis Ababa in the southern part of the country, while Hosaina is at 260km distance on the Addis Ababa – Butajira – Hossana trunk road. The proposed project work is an upgrading work of the existing deteriorated gravel road to an asphalt road standard and will have an estimated road length of about 121kms.

The road project traverses Cheha & Gumer Woredas of Gurage zone, Geto and West Azernet Berbere Woredas of Silte zone, Limo Woreda and Hosaina special Woredas of Hadiya zone. The Woredas have high agricultural potential and are densely populated rural settlement areas of the country.

2. Objectives of the EIA Study

The purpose is to ensure that decision-makers consider environmental impacts before deciding whether to proceed with the road upgrading project of Wolkite-Hosaina road project. It is a process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Therefore, the EIA study objectives include;

- to assess the likely impacts of the Wolkite - Hosaina road upgrading both on the natural and socio-economic environments;
- to alert project affected communities and residents, as well as planners and decision-makers to the likely positive impacts and negative consequences, and ensure that human values and concerns are receiving proper attention and consideration during the design, construction and implementation of the project road.
- to make analyses and define the resulting likely adverse impacts
- to carry out detailed environmental and social impacts assessment and analyses to more precisely indicate major beneficial and adverse impacts that would be caused as a result of project implementation.
- to identify and propose appropriate mitigation measures to be incorporated in the design and construction activities of the road project which will be followed by the preparation of environmental management and monitoring plan to be used during the construction and operation phases of the project.

3. Methodology

The study followed standard environmental impact assessment methodologies and procedures, EIA- guidelines prepared by the EPA and ERA-standard methodologies and procedures manual for road projects' impact assessment.

Data collection was done both from primary sources and secondary sources for base line environmental situation assessment. During the site visit, physical observation of the environmental settings of the route corridor was made and inventory of the observations were noted. Parallel to the physical observations, consultations and interviews were also made at village centers and townships falling in the route corridor. Analyses were made to develop cost-effective mitigation measures.

Consultation with relevant stakeholders and project affected people (PAPs) were conducted at each locality. Local administrations and relevant institutions were contacted and involved in data collection, during discussion sessions and for coordination of focus group discussions. Discussions and briefings on the project objective, the possible impacts that can result during the project implementation, cooperation needed from the Woreda administrations and from the community were raised and discussed, with council members of each Woreda administration in the four Woredas. Minutes of meetings were also recorded and signed, as annexed to this report.

4. Policy and legal frame works

There are several policy and legal documents both at federal and regional level as regards to environmental management and development projects. Accordingly, number of policies and strategies, environmental legislation, EIA guidelines, and institutional and administrative framework were developed at national and sectoral levels in order to address environmental issues in development projects. These policies, strategies and sectoral guidelines are all in line with donors' environmental requirement. World Bank Safeguard policies relevant to the current project are also considered in the study. Of all the ten current World Bank's Safeguard Policies, only three policies are triggered by the proposed road project for upgrading. These include; *OP/BP 4.01 Environmental Assessment*, *OP4.11 physical cultural Resources* and *OP/BP 4.12 Involuntary Resettlement*.

5. Project Description

The proposed road project is upgrading of the existing gravel surfaced road to Asphalt Concrete standard with 7.0-m wide carriageway and 0.5-1.5m wide gravel shoulders on either side depending on terrain type in rural sections and a two way 14m wide carriageway width, 3.5m parking lane and 2.5m side walks in town sections. The proposed road alignment mainly follows the existing Welketie - Hosaina road. However, there are two minor realignment sections; 1) starts at 4.3km and runs for 1.4km on new alignment about 0.25km off set and ends at 5.7km to improve the horizontal alignment at

Wabe River., 2) starts at chainage 55.9km which runs for 0.5km realigned about 0.14km off the existing road. The pavement structure is designed for a 20-year design period.

6. Project Location

The road upgrading project is located in the South Nations Nationalities and People Regional state. The start of the project, Welkite is located at 8° 16.6' Latitude & 37° 46.4' Longitude and is found 158 km from Addis Ababa, on the Addis Ababa – Jimma trunk road. Whereas the destination point of the project, Hosaina is located at 7° 33 'Latitude & 37° 51' Longitude is 260kms away from Addis Ababa and is on the Addis Ababa – Butajira – Wolayita trunk road. Wolkite and Hosaina are the start and end of the project, respectively. The project road connects three Zones and traverses five rural Woredas and two special Woredas; namely Wolkitie special Woreda, Chaha and Gummer Woredas in Gurage Zone, Mirab Azernet Woreda in Silte zone and Limo Woreda and Hossana special Woreda in Hadya zone.

7. Project Activities

The activities of the road project comprise; upgrading of the main road to Asphalt Concrete standard with 7.0-m wide carriageway and 0.5 - 1.5m shoulders width depending on terrain type in rural sections and a two way 14m wide carriageway width, 3.5m parking lane and 2.5m side walks in town sections). Major activities include but not limited to:

- clearing and grabbing grasses and bushes, earth work involving excavation, cutting, filling, rock blasting and disposal works of soils and rock materials,
- new bridge construction and rehabilitation, drainage structures, biological and physical erosion control structures, slope protection measures, ,
- development of construction material sites (like quarries, borrows), construction of diversions and access road and their restoration/reinstatement works, erecting crusher and asphalt plants, explosives store and campsites establishment, garage and work shops establishing and operation,
- etc

8. Baseline Environmental Condition of the Road Route Corridor

8.1. Topography and Land Use

The road route predominantly traverses through flat to rolling terrain in the Gurage zone, occasionally encountered rugged mountainous terrain section towards the last section in Silte Zone and partly also in the Hadiya Zone. Terrain classification of the road route is estimated as 64% flat, 30% rolling and 6% mountainous including built-up area in town and villages. The route corridor is also crossed by major rivers such as Wabe River at km 3.7, Megecha River at km 12.8, Gogeb River Gotam River at km 27.7, & Betena River at km 115.5.

The dominant land use/land cover of the route corridor is characterized by intensively cultivated and settled rural settings. There are annual crops like barely, wheat, teff etc. Perennial crops like inset, coffee and fruit trees are intensively cultivated along the route and at some locations they are found including in the ROW width of the road. The major soil types observed along the sides of the proposed road project are red clayey soil and also in some areas there are Brown to dark clayey soils.

8.2. Flora /Fauna

Regarding the vegetation cover along the project road, limited indigenous tree species are observed at some cultural sites like the Mugo Mountain where it is by tradition not cut. These trees include mainly *Olea africana* (Weyra), *Cordia africana* (Besana), *Hagina abyssinica* (Koso), *Podocarpus gracilior* (Zigba).and others. In addition to these preserved natural forest areas a common feature observed in the project area are forests made up of planted trees. These are quite well protected and the planted trees are mainly *Grevillea robusta*, *Eucalyptus* species (Bahir Zaff) and *Juniperus* spp (Tid). These tree species are found in farmers' homestead.

Regarding the wildlife resources in the project area, the common types include monkeys, apes, hyena, porcupines, pigs, etc. Any poaching activity of the limited resources by the construction workforces will be prohibited and provisions shall also be included in the contractual document.

8.3. Drainage and Settlement

The project area falls in the Ghibe River drainage basin and has several surface water resources. Water resources found in the route corridor include rivers and streams like; Wabe River km 3.7, Megecha River at km 12.8, Gogeb River Gotam River at km 27.7, , & Betena River at km 115.5, Lake Areket and wetland area of the lake at km 60. The road also traverses several settlement sites and townships like; Lera, Endibir,Areket, Qebul, Guber etc. The rural community in the project area mostly settles along the road sides and settlement sites are found at different locations along the road route.

8.4. Physical and cultural Resources (PCR)

Though not officially registered, there are some known cultural sites within the project influence area which are recognized by Regional/Local Culture and Tourism Bureau especially in Silte Zone. During the revision of this EIA report (dated 20 January. 2009); SNNP Region Bureau of Culture and Tourism and the three Zones Culture and Tourism Offices were consulted on the availability of any area (s) of significance. As per the information received and observation made by the consultants, the following sites are identified, which include:

1. **Mugo Mountain**, 82km, that is located on the right side of the road project, about 3km off the proposed road, hosts two very old Mosques (approx. 200 years old) which are recognized as one of the cultural and tourist attraction sites in the SNNP.

This mountain is covered with dense forests of indigenous (e.g. Ficus, sp, Olea africana, Juniparus gracilor and procera, Corrdia africana, and etc) tree species. It is also rich in wildlife species,

2. **Belechi Valley**, at 83km about 1km off the proposed road, recognized cultural sites in the SNNP, for its strategic nature and aesthetic value, it used to serve as a military strategic place where they used to hide themselves during the civil war, and
3. **Old Burial Sites**, at about 95km, there is an old Muslim burial site on both sides of the road. This site is outside the ROW but located within the road corridor.

8.5. Public Consultations

Consultations with PAPs and the local authorities were conducted at various locations along the project road. This project has identified two groups of people, project beneficiaries and the affected people, as the primary stakeholders. In addition, there is one group of secondary stakeholders, who are government officials, with whom intensive focus group discussions were carried out, in addition to consultations carried out with influential individuals.

The overall purpose of the discussion was to 1) inform, generate, and empower the PAPs, local authorities, and other key stakeholders about the project objectives and the socio-economic benefits of the proposed road project, 2) obtain the commitment of the local authorities to prohibit any further encroachment and development in the ROW after the cut-off -date, 3) ensure the availability of land for relocation and to prove the same to the PAPs, AND 4) Encourage them involve in the project planning and implementation processes and also inform them the EIA and EMP for implementation.

During the field visit, discussions were held also with local authorities and as an outcome the officials agreed to;

- prohibit and deter newcomers from erecting or carrying out any activity within the ROW;
- provide land for the PAPs, monitor the PAPs in the construction of structures and preparation of sites for resettlement;
- agreed to cooperate with the construction contractors and supervision consultants in the process of land acquisition; and
- agreed to play key role in the overall implementation of the project road; etc

The project affected persons were informed about the project's local, regional and national level benefits, and finally accepted and agreed to take part in the project implementation processes 1) up on the effect of adequate payment of compensation for their affected properties, and 2) showed their commitment to stand in line with the government policies and development strategies and involve in the project planning and implementation.

Regarding the Physical Cultural Resources (PCR), as mentioned above, the outcome of the consultation with the Regional and Woreda Culture and Tourism Bureaus revealed that there are some cultural and burial grounds along the project road that will be affected directly or indirectly by the road project construction.

During the appraisal, Consultations were made with the local administrations and religious leaders to reaffirm the issues of the PCR (especially the grave yards along the existing road route). Consultations were made at three locations; Mugo town (km 88), Hosaina (destination of the project) and at Walkitie towns (project road origin). The focus group discussion asserted that the construction of the road is at the top of the community's priority agenda, and that they are willing to cooperate and facilitate the project implementation as required. Regarding the graveyards, they have promised not to extend towards the road but use the plots at the back for the future.

9. Potential Project Impacts and proposed Mitigation measures

The project will have both beneficial (positive) and adverse (negative) impacts to the natural and socio-economic environments.

The beneficial impacts of the project include improving market opportunities, providing access to improved and better social service facilities, creating improved communication, improving the supply of agricultural inputs, creating employment opportunities for the local labor force thereby contribution to the reduction of poverty at the household level, enhancing investment and employment opportunities, contributing to income generating activities, and improving the situation of women by creating better access to transport and other facilities, resulting in higher incomes to the farming households.

Additionally, the project road, in its short and medium term, will create impacts such as reductions in vehicle operating, transport and time costs for public passenger and freight transports and for private vehicle users, and improvement in the availability of transport facilities and services, while in the long term development impacts, it will bring about economic growth and changes in the livelihood conditions of the people residing in the project area.

The main adverse environmental impacts of the Welkite – Hosaina road project include;

1. **Impact on Flora:** There are no significant forest areas along the road project, but, impacts on Yegera protected forest at station 24km, which is located outside the ROW at about 1.0km away from the road project. However, diversion and access road constructions, stockpiling of excess cuts, material sites establishment, and dust pollution will affect the Yegera protected forest. Beside this, road side tree plantations (both natural and artificial) will also be affected as a result of direct road construction project
2. **Impacts on Fauna:** the project road corridor is neither contiguous with, nor in close proximity with any of these nationally protected areas, however the few existing

- wildlife species that exist along the road area which include ape, monkey, and other smaller wildlife, may be impacted by high speed vehicular traffic, and poaching,
3. **Impact on Soil:** erosion-due to embankment fill, un-surfaced diversion and access roads, quarry and borrow sites, untreated stockpile of construction materials/spoil,
 4. **Impact on surface and sub-surface water bodies:** contamination due to oil leakages from equipment and plants, dirt flow from construction site, camp sites. There is only one wetland is located along the project road, called Arekti Lake which is located at 64.3km which will likely to be affected by the road construction project
 5. **Impact on Air Quality:** this includes pollution as a result of emission from construction machinery and transport vehicles as well as dusts during and after project implementation.
 6. **Impact on Slope Stability:** the slide prone areas at 71+000 to 73+000, 81+050 to 81+200 and 81+700 to 82+000, would be exacerbated by the construction activities in its proximity,
 7. **Impact on the Physical Cultural Resources (PCR).** the old Muslim burial site at km - 95 is located on both sides of the road may experience cracking due to vibration of pavement compacting equipment, also rock blasting may affect the two 200 old mosques at km 82.

Adequate and appropriate mitigation measures have been identified and proposed for these likely impacts of the project road on the environment. Some of the mitigation measures have already been included and while some will be included as environmental clauses in tender documents and construction contracts.

Among many of the mitigation measures recommended and integrated in the project design and the contract documents include:

- The use of only the essential part of the RoW during construction to minimize tree cuttings, planting seedlings as part of the contract for lost trees, establishing designated spoil areas in consultation with the regional and woreda culture and Tourism Bureaus,
- The design includes safe wild animals' passages (culverts) under the roadway, awareness campaign to the workforce to protect the wild animals from traffic accidents,
- Proper design of culvert outlets are provided in the design to minimize erosion at downstream, the technical specification will include provisions to properly stockpile and compact spoil material,
- Maximum care will be taken while transporting hazardous chemicals and fuels, besides the contract will obliges the contractor to adopt a maintenance practice to minimize oil and lubricant leakages to the surroundings,
- Construction machinery and vehicles should regularly be maintained to increase engine efficiency and hence to reduce emission to the air;
- Slopes are appropriately design to ensure stability and appropriate drainage design

- is included to move water away from the slope, which would otherwise undermine the slope stability,
- Construction of diversion road, production of construction materials, rock blasting on the road formation activity if any, will be strictly avoided and other alternatives to this activities such as location of other material sources, half road width construction, etc. will be suggested by the contractor and approved by the supervising consultant, to minimize any negative impact on the PCR.

10. Environmental Management & Monitoring Plan

Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures responsible bodies for the various actions are summarized as part of the EIA, which should be closely monitored and supervised by ERA EMSB have been out-lined in the above sections. Implementations of these measures have to be carried out at different stages of road construction & operation phases.

Environmental monitoring will be conducted with two major objectives;

- a. to ensure the proper implementation of the mitigation measures in line with the EIA proposal (compliance monitoring)
- b. to compare the environmental conditions and changes of the project area after project implementation with that of pre - project situation (Effects monitoring).

The management & monitoring exercise shall be carried out both internally and by external institutions and stakeholders as needed, and by qualified experts and institutionally organized body. These are indicated in the mitigation management matrix against the identified monitoring activities. The training and capacity building needs have been identified and recommendations are included along with the necessary budget.

11. Costs of Environmental Mitigation and Monitoring Plan

Major Costs related to environmental enhancement measures that require physical construction works will be estimated and included in the engineering design and tender documents. Some bio-engineering mitigation measures required are estimated and included in this section. The monitoring and capacity building costs are also estimated and included in the report. Apart from the cost of relocation/ compensation and the costs already included in the engineering cost estimate, the cost of environmental mitigation measures is estimated at **ETB, Birr 3,550,740.00**. These measures include: bio-engineering measures, relocation of grave yards, training, awareness creation on HIV/AIDS (the HIV/AIDS Prevention & Control Activities Program, along the project

road will be executed by the Sub-contractor to be recruited by ERA during mobilization stage as part of the Construction works), environmental inspection and monitoring costs.

12. Conclusion and Recommendations

The findings of this EIA reveals that the construction and operation of the Wolkite-Hosaina Road Upgrading Project will have several beneficial as well as adverse impacts on the biophysical and socioeconomic environments of the project area. Most of the impacts on the environment are manageable and minimum in most of the cases. Generally, the positive impacts of the project are found to outweigh the negative impacts, provided that the proposed mitigation measures are implemented properly as the project road follow more or less the existing alignment.

The following are some of the recommendations made for the implementation of Welkite-Hosaina road project;

- the mitigation measures discussed in the EIA-report are incorporated in the project design and tender documents: BoQs, drawings, specifications and contract documents. In order to enforce the implementation of these measures the contract documents will further provide for appropriate environmental clauses as necessary. The will require the contractor to follow environmentally friendly work discipline, while project implementation;
- the Supervising Consultant will liaise with and consults the local community and administrative organs to find their needs and constraints at each location and try to incorporate their requirements and opinions in the design as far as possible
- the client, together with the local environmental authorities, will ensure the appropriate locations of the material sites; spoil dumping sites, and construction campsites and their proper reinstatement upon completion of the project works, as required.
- The client, together with the federal and environmental authorities, will make sure the provisions in the country's and international laws/regulations are respected or fulfilled;
- the ERA-EMSB will ensure the preparation and its implementation of detailed action plan for either section(s) of or the entire road project and continual improvement/updating of the action plan throughout the project life.
- the local administration, namely Zone, Woreda, and Kebele administration will be very helpful in facilitating the project activities through solving problems related to land acquisition and displacement, and therefore their involvement of stakeholders will be promoted

Fig. 2.1. Route Map

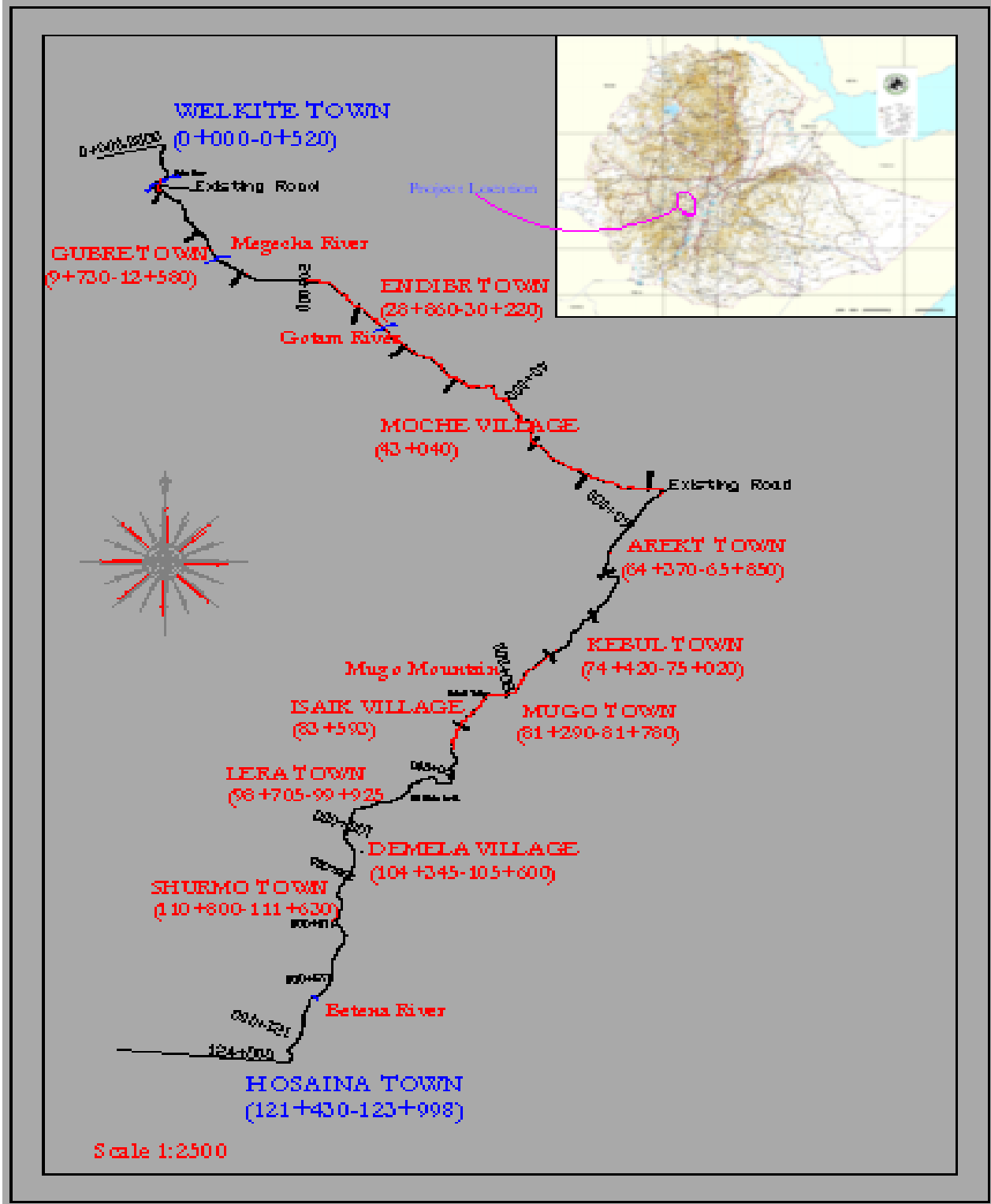
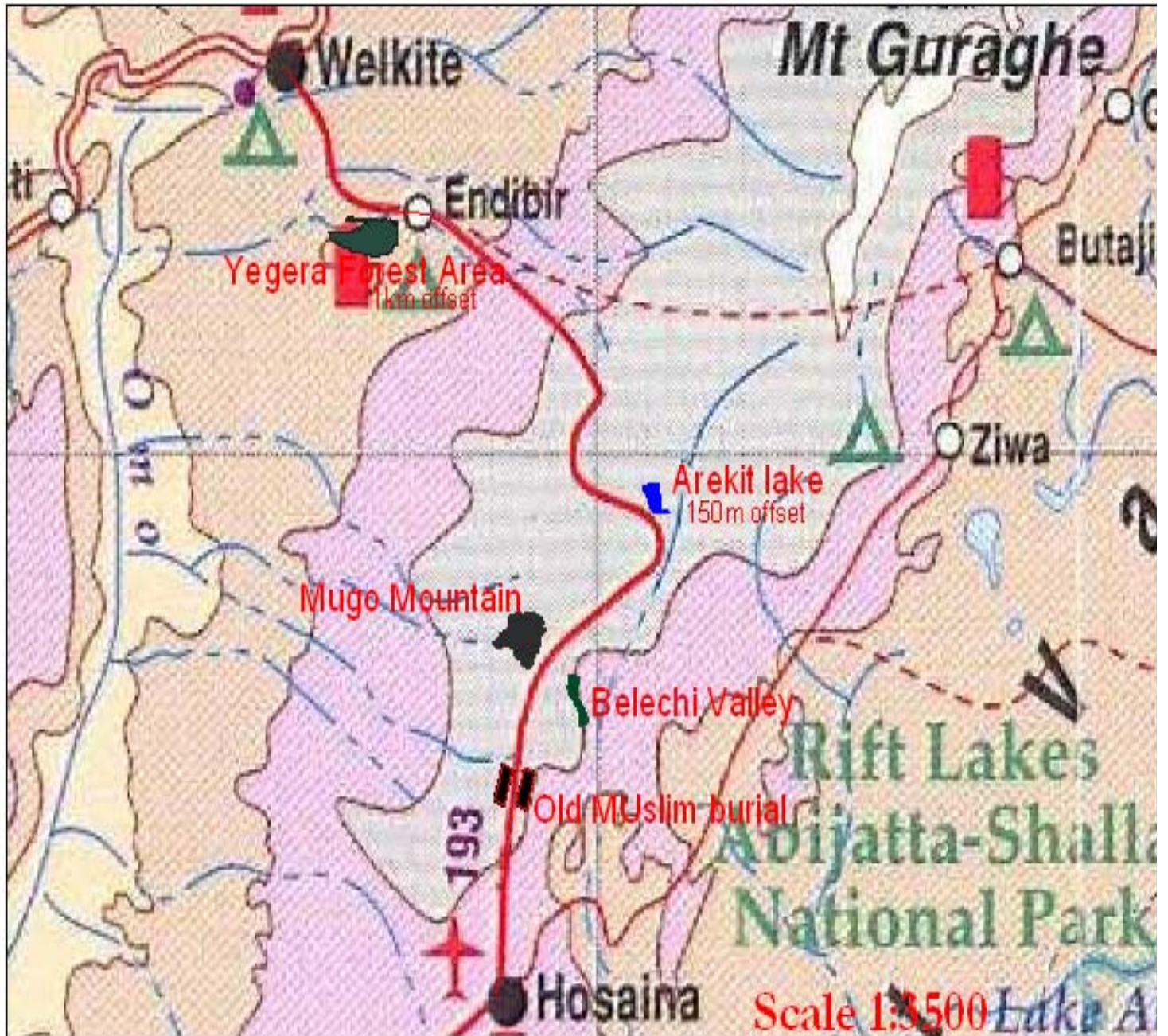


Fig. 2.2 Environmental Map



Part III – Ankober-AwashArba Link Road Project

1.1 Introduction and Background

The Government of the Federal Democratic Republic of Ethiopia (FDRE) has obtained a credit from the Nordic Development Fund (NDF) towards the cost of Consultancy Service for the Feasibility Study, Environmental Impact Assessment (EIA), Detailed Engineering Design and Tender Document Preparation for Ankober - Aliyu Amba - Awash Arba Junction Road Project. The Consultancy Service for the said activities was signed between ERA and Finnroad in association with SABA Engineering in July 2006.

This report covers the EIA study of the proposed road project. This EIA examines the potential environmental impacts of three alternative routes – A, B and C – which were identified and analysed in the Feasibility and EIA studies. Based on the findings of this assessment, the EIA report recommends alternative B to be implemented under APL4.

1.2 Project Description

The proposed Ankober – Aliyu Amba – Awash Arba Junction road, which runs along the ancient camel-caravan traders' road from the old Red Sea ports to the Christian "Abyssinian" highlands, is located in the Amhara and Afar Regional States, in the eastern central part of Ethiopia. The proposed road starts at the town of Ankober, and ends at Awash Arba Junction on the Addis – Djibouti trunk road. As a road along the ancient trade route, it has great potential not only in social & economic development, but also for potential tourism development and its importance has been recognized for decades. The existing road on average has 6m carriage width, and only the first 14.5km and the last 7.5km sections are engineered gravel roads, while the rest sections are just earth tracks. In addition, only the first 14.5km was provided with cross drainage structures and short side drains for some subsections only except a steel bridge over Awash River at 65km. The rest sections do not have any drainage structures or adequate side drains.

Three alternative routes, designated as A, B and C, were identified and examined for technical and economic feasibility as well as social and environmental acceptability. Based on the results of economic analysis, ERA's design standard DS6 has been adopted for the proposed road.

Starting point for all alternatives is at 2.9 km from the centre of Ankober town. Alternative A follows the existing road alignment passing through an existing gravel road for the first 14.5 km and then continues on a motor track for about 22 km to Dulecha. The terrain is mountainous to escarpment till Gacheni and then rolling from Gacheni to Dulecha. From Dulecha the existing road traverses mostly flat terrain up to Hurunto. From Hurunto road alignment traverses through Awash River flood plain for about 15 km and passes over Awash River at km 65, near the village of Bolhamo. After Awash River, the road alignment follows the existing road alignment passing through the town of Melka Werer and ends at Awash Arba Junction. Alternative A has a length of 90.3 km.

Alternative B follows mainly the same route as alternative A. However, it offsets the existing road within the first 14 km to mitigate the effects of excessive earthworks that would result in case the existing road geometry was fitted to ERA's road geometry standards set by the DS 6 standard. To provide link to Gacheni town the Alternative B alignment differs from the alternative A and existing road at km 25 and traverse through the Gacheni town and connects to existing alignment again at km 27. In this subsection the existing road, that alternative A follows, is so severely eroded that the existing traffic traverses through the Gacheni instead of using the alternative A. From km 27 to km 52 follows the existing one along alternative A and from km 52 to 63 it diverts to have the best alignment in terms of design and shortest route. From km 63 onwards, all the way through Bolhamo and Melka Werer to Awash Arba Road Junction, it follows the existing alignment. Alternative B has a total length of 88.6 km.

Alternative C starts 2.9 km from Ankober and continues at a lower altitude south-eastern direction making three major deviations from the route alignment followed by Alternative B. In due course, it diverges from the other two alternatives for about 48km. Alternative C avoids seasonally flooded areas near Dereke and Melka Jebdu rivers and reduces the number of major drainage structures. The alignment traverses mountainous and escarpment terrain for 25 km up to north of Gacheni, then through rolling terrain for 10 km up to Dulecha and mostly flat terrain for 17 km up to close to Hurunto. From Hurunto, the route creates 27 km straight new road connection via Dofen to Melka Werer. From Melka Werer to end of the project it follows the same route of Alternative A and B. A new bridge, with a length of 45-50m, is needed for crossing the Awash River. It connects major settlement areas of Ankober, Dulecha, Hurunto, Dofen and Melka Werer, but bypasses Aliyu Amba and Bolhamo. This alternative has a total length of 86.5km.

Ultimately based on the results of the economic, social and environmental impact analyses, Alternative B was found to be the most feasible alignment and thus, recommended to be adopted for the proposed road project. The baseline environment of the proposed road is briefly described in section 4 below.

In summary Alternative A follows existing gravel roads for 22km (24%) and existing tracks for 68.3km (76%), and has no new route section. Alt. B goes along existing gravel roads for 7.5 km (8.5%), existing tracks for 54km (61%) and new route to meet the design standard for 27km (30.5%); whereas Alt. C . travels over existing gravel roads for 12.5 km (14.5%), existing tracks for 26 km (30%) and new route for 48 km (55.5%). Thus, of the total length, 75.6% of A, 91.5% of B and 85.5% of C have no any pavement and drainage structures, and even the existing road sections have no adequate cross and side drainage structures. The existing roads and tracks have on average 6m carriage width. Based on the results of economic analysis, the proposed road is recommended to be built at DS6

standard, which will have 6m carriage width, and variable sizes of side drains and embankment slopes. According the preliminary engineering design carried out for Alt. B, the ‘cleared’ width, i.e. the width of the land area to be affected or taken for building of the road varies from 12.5m to 30.4m with an average of 18.6m. According the preliminary engineering design carried out for Alt. B, the footprint of this alternative varies from 12.5m to 30.4m wide with average of 18.6m for a total length of 88.6km, and this will require a new land grab of about 130 ha. This is estimated based on the average width of 18.6m for realignment sections and 12.6m for existing road sections; the latter figure was obtained after deducting the average width of existing road sections, i.e. 6m.

1.3 Description of Baseline Conditions

1.3.1 Physical Environment

The topographic set up of the route corridor varies from a steep and rugged mountainous and escarpment terrain to dominantly flat terrain. Altitude ranges from the highest point at Ankober, 2970m masl, down to the Awash River, about 800 masl, with elevation difference of about 2170m. The estimated terrain classification for the project route is 62% flat, 13% rolling, 20% mountainous and 5% escarpment.

The climate of the project area varies with altitude. The first 20km section is located in ‘Dega’ zone with mean annual rainfall of 1000mm to 1200mm. The km 20-40 is situated in ‘Weina Dega’ zone and receives 600 – 700mm of annual rainfall, and the remaining is located in ‘Kolla zone’, which receives 400 – 500mm per annum. The project is situated within the Awash Basin and crosses the Awash river. It also runs along other major rivers including Melka Jebdu, and Gayseno. The dominant soil types along the first 37km section are reddish brown and greyish silty gravel and weathered basaltic rock. For the rest of the project area, brown clayey silt mixed with sandy gravel, and alluvial deposits are observed. Soil erosion is serious along the Ankober - section. Beyond , the rate of erosion is mostly minor except at some spots.

With regard to land use and land cover, the corridor of Ankober - Aliyu Amba section is dominantly cultivated and the remaining is occupied by settlements and tree plantations. The corridor of Aliyu Amba – Dulecha section is dominantly covered by bush lands but also some cultivation. The section from Dulecha to Awash River passes through a vast and flatter lowland areas mostly covered by Acacia bush lands. The remaining section mainly traverses a vast intensively cultivated land, which is under large scale irrigated agriculture.

1.3.2 Biological Environment

The natural vegetation of the corridor of Ankober – Aliyu Amba section has been highly modified by man. Thus, only some patches of remnant vegetation are found in the area especially on steep slopes of mountains and escarpments.

Between Aliyu Amba and Awash River, the natural vegetation is dominantly dense Acacia bush land with dense stands of Acacia woodland particularly along river banks. In the area after Awash River, the natural vegetation has been extensively cleared to give way for irrigated agriculture. However, an aggressive bushy plant called Mesquite has extensively invaded the existing road sides and irrigation canals.

The wildlife variety and population in the project corridor is rather low mainly because of habitat degradation related to over-exploitation of the natural environment for socio-economic development activities including cultivation and intensive livestock grazing and browsing. It appears that hunting pressure is also significant. The wild animals reported to be found in the area include Bushbuck, Bush Duiker, Dik-dik, Klipspringer, Lesser Kudu, Oryx, Soemmering's Gazelle, Warthog, Hamadryas Baboon, Vervet Monkey, Hyena, Porcupine, and Common Jackal. Others included Aardvark, Cheetah, Abyssinian hare and Lion. The project area is very rich in birdlife and has two sites designated as Important Bird Areas; these are found between Aliyu Amba and Dulecha and along the Awash River.

Two important bird species living in the vicinity of Ankober and the Aliyu Amba-Dulecha area are the Ankober Serin and the Yellow Throated Serin, respectively. The environmental contract clauses will require, for example, that (i) quarry sites not shall be established within 20 km of the cliffs of the Ankober-Debresina escarpment – the habitat of the Ankober Serin; and (ii) streams shall not be diverted and a sufficient number of culverts are constructed to ensure regular water flow for the Yellow Throated Serin.

1.3.3 Archaeological, Cultural and Historical Sites

The project road runs along the ancient camel-caravan traders' road from the old Red Sea ports to the Christian "Abyssinian" highlands, and like all ancient caravan routes, the old road itself is likely to yield undiscovered cultural artifacts. It has three stages (roughly corresponding to altitude and ecological sections):

- (i): Ankober to Aliyu-Amba: This was the entry-gate to highland Abyssinia. Starting at the capital of Shewa (1745-1889), route passes through a scenically dramatic escarpment landscape rich in cultural heritage; presently being considered as one of Shewa's new tourist circuits/destinations. A culturally and scenically sensitive area for largely Christian heritage. Nevertheless, according to the Amhara Culture Tourism Bureau confirmed in January 2009, there is no recorded Physical Cultural Resources (PCR) along the proposed road alignment. The consultant's close observation did also confirm that such sites are not apparent along the project route. The road project is designed to start 2.9 km away from the center of the historical Ankober Town, thereby minimizing the negative impact of the construction of a road through locations of historical importance.

- (ii) Aliyu Amba to beginning of lowlands: Characterized by rich Moslem heritage.
- (iii) Lowlands: Like much of Africa's Rift Valley, inhabited by early hominoid, therefore rich in potential paleontological sites. Likewise, according to the Amhara Culture and Tourism Bureau confirmed in January 2009, there is no recorded Physical Cultural Resources (PCR) along the proposed road alignment.

Like any historical routes, there is however a very high likelihood of encountering physical cultural resources (PCR) of various type during the during the construction period, which needs to be addressed in the supervision consultancy services of this project in order that any such encountering should be reported to the Amhara Cultural and Tourism Bureau and/or relevant authorities and the mitigation/preservation measures be consulted and implemented as necessary.

In addition to the above, various researches have so far identified nine paleoanthropological sites in the Afar Region. Of these, two sites, namely the Kesem-Kebena and Melka Werer Research sites are situated in the region traversed by the proposed road, but both sites will not be affected. The Kesem-Kebena site is located between the Kesem and Kebena rivers at a minimum distance of 10km from the alignment selected for the road project, i.e. Alternative B.

It is strongly recommended that ERA identify alternative sources of sand because the quarrying of river sand as currently proposed in the Engineering Report as well as road cuts would destroy the ancient conglomerate sediments associated with ancient channel systems and early hominoids. ERA will discuss this issue with ARCCCH.

1.4 National Parks and other Protected Areas

Ethiopia's 'protected wildlife areas' comprise 9 national parks (NPs), 3 wildlife sanctuaries (WSs), 11 wildlife reserves (WRs) and 18 controlled hunting areas (CHAs). Of the NPs only two have been legally gazetted, and none of these are situated within the influence area of the Ankober-Aliyu Amba-Awash Arba road. Between Dulucha and Awash River, there was Awash West Wildlife Reserve (WR), which is traversed by the road project. However, according to recent information obtained from the Ethiopian Wildlife Development and Conservation Authority, political decision taken by the Ethiopian Government to implement a large scale dam and irrigation development within the Awash West WR has led to the abandonment of the reserve. In addition, the last 5km stretch of the project road skirts along the southern edge of Bilen Hertalle Controlled Hunting Area. The vicinity of the road was said to contain few wild animals because of intense human activities in the area including irrigated farming, livestock grazing and settlements.

Furthermore, the Awash West Wildlife Reserve has been divided into three controlled hunting areas, where the third area, Kebena, has been dedicated to

irrigation activities. The initial irrigation schemes were established in 1976, and subsequently the Amibara Irrigation Project (1977-1983). The Manager of the Awash River Basin Authority confirmed that the project road runs through the irrigated areas of Amibara, and runs at a distance of at least 30 km from the wetlands of the Bilen Hertalle Controlled Hunting Area. Therefore, the proposed road will not have negative effects on wildlife reserve areas and wetlands.

1.5 Environmental Impacts and Mitigation Measures

Implementation of the envisaged road project is likely to bring the following key adverse environmental impacts.

1.5.1 Impacts on Physical Environment

Soil erosion/impairment of soils: Upgrading of the existing tracks and construction of the realignment sections will involve extensive earthworks to build the carriage width and construct side and cross structures. This will result in exposure of the soil to erosion by runoff water and wind. For the section between Ankober and Dulecha, topographic and climatic factors such as hilly and mountainous terrain and high intensity of rainfall will aggravate the rate of soil erosion by water. The soils in the rest part of the project area are mostly highly erodible but the rate of erosion is likely to be mollified by flat topography and low rainfall. Between Aliyu Amba and Gacheni, due to its location along a flood prone area, some sections of the road will be vulnerable to flooding and erosion by river water. Therefore, physical structures like retaining walls and gabions will be designed and constructed in order to protect the road from damages by flooding and erosion.

Slope instability and landscape intrusion: Cutting in steep slopes for construction of the realignment section along the first 14km and disposal of the cut materials on down-slope may trigger some slope instability problem in mountainous and escarpment areas. Cutting in slopes will likely increase slope inclination (angle of cut-slope) and height, and reduce the shear strength of the slope forming materials. Other causal factors include types of slope-forming materials and high intensity of rainfall.

Impacts on Water Resources: Construction of the road will pose risks to the water quality of Awash and other rivers crossed by the road or located in its vicinity. The main sources of impacts will be excavation for foundation of structures, soil erosion created and enhanced by the road construction works, spillage of pollutants and discharge of waste waters from construction camps. These may cause significant increase in sediment loads of the rivers and pollution of the river water. Although it is not potable, the water from the rivers is used by the local communities for drinking and other domestic uses.

Impacts on Air Quality: During the construction phase, the traffic volume will undoubtedly increase resulting in local air pollution mainly due to dust and noise.

The main sources of air and noise pollution will be land clearing and earthmoving activities, aggregate production, loading and unloading of materials, and operation of heavy equipment and construction vehicles. These may cause nuisance to local residents and business activities mainly in the towns and villages along the road. The prevalence of strong wind especially in the lowland areas may aggravate the problem.

1.5.2 Impacts on Biological Environment

Loss of Vegetation: Impacts on natural vegetation will be mainly related to land clearing for increasing the road width along the existing road sections, road construction along the realignments, exploitation of quarries and borrow sites, and construction of access roads to material sources. Along the Ankober – Aliyu Amba section, mainly plantation trees and some indigenous trees will be affected. Along the rest part of the project, construction of the road will affect Acacia bushes and trees, which is usually relatively dense, mainly due to widening works that would take on average about 12.6m width, construction of the realignment sections at km 25 - 27 and km 52 – 63 that would consume on average about 18.6m, and exploitation of material sources. In particular the impacts on woodlands found along the perennial and seasonal rivers may be significant.

Impacts on Wildlife: Impacts on wildlife will be mainly related to loss of small parts of the available habitats and disturbance to the wildlife inhabiting in the area particularly along the section between Gacheni and Awash River. The main causes will be widening of the road width or construction of the realignment at km 52 – 63, exploitation of construction material sources and haulage of materials. The extent of habitat losses will be relatively small considering the wide area of available habitats and with the limited widening of the exiting road in this rather flat area (maximum 5 meter on both sides). Therefore, no significant disturbance or loss of habitats is anticipated. Nevertheless, the noise pollution resulting from operation of construction traffic and heavy equipment during the road works may cause migration of wild animals away from the immediate vicinity of the road or the material sites. In addition, there may be killings of some wild animals due to collisions with vehicles.

1.5.3 Impacts on Archaeological and Historical Sites

The presence of any fossil remains in the area to be disturbed by road construction works is not certain at this level. However, assets of archaeological or cultural value may become apparent during excavation for the road construction. Therefore, it is important that the Contractor is aware of this situation and take necessary precautions during the road construction works and take necessary actions (as recommended in this EIA report) if any properties of cultural value are uncovered.

1.5.4 Impacts of Induced Development

Once the road is built and operated, a number of induced human activities are likely to result including expansion of cultivation, growth of existing towns and villages, establishment of new unplanned settlements and increased exploitation of forest resources. The new villages or towns could be spontaneous and generally unplanned, and without basic services. Establishment of new villages or expansion of existing ones means increased population and increased demands for land, forest products and other natural resources. These will increase the pressure on natural resources particularly forests, and may degrade the forest cover and wildlife habitats of the influence area. Certain development control of induced human activities as mentioned above by then regional government, especially in the region between Aliyu Amba and Awash River, will be important. Overall, however, this project will bring to the local communities a long-awaited social and economic development along this historical caravan road.

1.5.5 Environmental Mitigation Measures

The engineering design attempts to avoid environmental components that are likely to be affected adversely by the project activities. However, adverse impacts that cannot be avoided would be minimized through implementation of appropriate mitigation measures. Accordingly, mitigation measures and mitigation management plans are proposed. The adverse environmental impacts that result due to the paved road route would be minimal.

Illegal hunting and encroachment into the wildlife areas shall be prohibited and supervised both by the project implementers and the local administrative structure. In addition regular awareness program to the work force and local suppliers will be implemented. Traffic regulations shall be put in place and traffic posts at critical locations be implemented to minimize accidents to wildlife.

Major impacts on drainage systems and surface and ground water resources would be dealt with by providing necessary cross drainage structures (culverts & bridges) to allow free flow of natural water, and also, during the construction period, necessary awareness will be provided to vehicular/construction equipment operators to maintain necessary vehicle maintenance to avoid potential oils leakage of these equipment on construction site – in order to minimize the potential risk of contamination of streams and rivers crossed by the project road or situated in its vicinity.

The quarry/production area has to be screened determined in consultation/approval of the supervision consultant and ERA EMSB whereby sufficient consultation should be conducted with the local administrations prior to commencing excavation activity to limit the area of disturbance. The left over spoil soil should be collected and kept aside for rehabilitation of the site at later stage of the work. Spoil should be shaped and compacted to avoid erosion and leakage to the river banks, water bodies or on dense vegetation covered ground.

Upon completion of the use of the production/quarry site, it should be rehabilitated and restored to a reasonable degree to its original state so as to avoid water ponds, soil erosion, aesthetically undesirable situations and disfigured landscape. Back filling, grading and re-vegetation of the site would help to mitigate the impact. Based on the site condition simple soil retaining structures and runoff water diversion structures might be required to stabilize the soil structure and reduce the effect of soil erosion until it consolidates.

Based on the Social Impact Assessment (SIA) findings that identify the number of persons to be affected by the subject project, Resettlement Action Plan (RAP) has been prepared.

Protection and preservation requirements for Cultural Heritages, Archeological sites and aesthetics of Landscape shall be specified in the construction documents for contractors, and training on awareness of the PCR will be provided to the site workforce. This include the provision of short term training for excavators on PCR artifact recognition, and rapid response system will be set up for PCR findings with concerned authorities.

It is required that the contractor should timely rehabilitate the excavated grounds as soon as site work is completed, maintain sanitary conditions in camp sites and work places and provision of sanitation facilities to the workers, avoid any stagnant water and unsanitary ground to avoid mosquito and vector breeding.

The design documents, contract documents and specifications prepared for this project require the contractor/s to take necessary protective measures to minimize potential impacts and will be closely supervised by supervising engineers and ERA's Environmental Monitoring and Safety Branch (EMSB).

It will be of paramount importance that the road design takes into account protective measures for the Ankober Serin and the Yellow Throated Serin as well as the need for alternative sources of sand and gravel. EMSB will have overall responsibility for ensuring that the design includes the appropriate environmental protection measures.

1.5.6 Environmental Management Plan

Environmental Management Plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures responsible bodies for the various actions are summarized as part of the EIA, which should be closely monitored and supervised by ERA ASMB have been out-lined in the above sections. Implementations of these measures have to be carried out at different stages of road construction and operation phases.

1.5.7 Environmental Monitoring Plan

Environmental monitoring shall be conducted with the following major objectives:

- a) To ensure the proper implementation of the mitigation measures in line with EIA proposal (compliance monitoring).
- b) To compare the environmental conditions and change of the project area after project implementation with that of pre-project situation (Effects monitoring).

The monitoring exercise shall be carried out by qualified experts and institutionally organized body. The training and capacity building needs have been identified and recommendations are included along the necessary budget.

1.5.8 Cost of Environmental Mitigation and Monitoring

Major Cost related to environmental enhancement measures that require physical construction works are estimated and included in the engineering design and tender/contract documents. Compensation for properties lost and relocation of Project Affected Persons (PAPs) is included in RAP report. Apart from the cost of relocation/compensation and the costs already included in the engineering cost estimate, the cost of environmental mitigation measures under this report is estimated to be Birr 5 000 000. These measures include: bio-engineering measures, tree replanting, training and awareness creation programs, cost for environmental inspectors, for supervision and monitoring activities.

1.6 Policy and Legal Framework

This EIA has been undertaken within Ethiopia's existing policy, legal and administrative framework as well as the World Bank's Safeguard Policies. The most relevant ones and how they are considered in the EIA study are briefly described below.

1.6.1 National Policy and Legal Framework

The Constitution of Ethiopia has provisions, which have direct policy, legal and institutional relevance for the appropriate implementation of environmental protection and rehabilitation action plans to avoid, mitigate or compensate the adverse effects of development actions including road projects. The concepts of sustainable development and environment rights are entrenched in the rights of the people of Ethiopia through Articles 43 and 44, which state among others the right to development and the right to live in a clean and healthy environment. The other important policy document is the Environmental Policy of Ethiopia (EPE), which has an overall policy goal to improve and enhance the health and quality of life of all Ethiopians, to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and their environment as a whole. The Environmental Impact

Assessment (EIA) policies emphasize the early recognition of environmental issues in project planning, public participation, mitigation and environmental management, and capacity building at all levels of administration.

In addition, the Government of Ethiopia (GOE) has issued several Proclamations that are aimed to foster environmental protection and sustainable use of the Country's natural as well as man-made resources. Among these legislations, the most relevant ones include the Proclamation on EIA, Procl. on Development, Conservation and Utilization of Wildlife, and Procl. on Research and Conservation of Cultural Heritage (RCCH). The EIA Proclamation makes an EIA mandatory for specified categories of activities undertaken either by the public or private sectors and is the legal tool for environmental planning, management and monitoring. The proposed road project has been assigned under the category of projects likely to have negative impacts and thus require EIA. Therefore, in accordance to this legislation, EIA has been conducted to determine the project's potential impacts and to develop appropriate mitigation measures to avoid or minimize the significant negative impacts to acceptable levels. The recommended mitigation measures are presented in an environmental management plan (EMP) which will be part of the project implementation plan (PIP). Furthermore, other pertinent legislations, the Environmental Protection Authority's EIA Guidelines, Ethiopian Roads Authority's Environmental Procedures Manual, and Environmental Institutions have been reviewed and incorporated into the EIA Report.

1.6.2 World Bank's Safeguard Policies

The World Bank's Safeguard Policies triggered by the proposed Ankober-Aliyu Amba-Awash Arba Junction Road Project and how their requirements will be reflected in the EMP are briefly discussed below.

- i The World Bank's Safeguard Policies triggered by the proposed Ankober-Aliyu Amba-Awash Arba Junction Road Project are the OP/BP 4.01 Environmental Assessment (EA), OP/BP 4.11 Physical Cultural Resources and OP/BP 4.12 Involuntary Resettlement. According to the OP 4.01, the Bank requires EA of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making through appropriate analysis of actions and of their likely environmental impacts. The proposed road project is treated as *Category A Project* [projects likely to have significant adverse environmental impacts] since it is likely to have a number of significant adverse environmental and social impacts. Therefore, EIA has been carried out to assess the project's potential negative and positive environmental impacts and to recommend measures that would reduce potentially significant adverse environmental impacts to acceptable levels. The set of mitigation, monitoring and institutional measures to be taken during the project implementation and operation are organized in the form of an environmental management plan (EMP), which will be part of the project implementation plan (PIP).

- ii) The objective of OP/BP 4.11 is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources, which may include movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. The proposed road project is located in a corridor which is recognized for its archaeological and historical significance. Therefore, the likely impacts of the road project on those sites of value have been assessed and mitigation measures recommended, which are included in the EMP for implementation.
- iii) The OP/BP 4.12 is aimed at either avoiding or minimizing involuntary resettlement where feasible, assisting displaced persons in improving their former living standards, income earning capacity, and production levels, encouraging community participation in planning and implementing resettlement, and providing assistance to affected people. This policy is triggered by the proposed road project since its implementation is likely to displace a number of families residing along the project route and cause loss of livelihood sources for several families as well. To address this issue, a resettlement action plan (RAP) has been prepared as a separate document and it has been disclosed.

1.7 Conclusion and Recommendations

The Ankober – Aliyu Amba – Awash Arba junction road project runs along the ancient camel-caravan traders' road from the old Red Sea ports to the Christian "Abyssinian" highlands, and its importance has been recognized for decades. The project will bring a variety of benefits at both local and national level. In particular, the impact at local level in increasing the reliability of road transport and the potential to develop the local economy through improved infrastructure and employment opportunities will be significant.

The proposed project activities may bring several negative impacts to the natural and social environment. Many of these impacts will be short-term and reversible in nature, but some will be permanent impacts. The potential significant impacts will include soil erosion, slope destabilisation, siltation, water pollution, air pollution, ecological disturbances (deforestation and disruption of wildlife), and spreading of communicable diseases. In addition, like all ancient caravan routes, the old road itself is likely to yield undiscovered cultural artifacts, and any cultural resources encountering should be reported to the local Cultural and Tourism Bureau and/or relevant authorities and the mitigation/preservation measures be consulted and implemented as necessary.

However, these anticipated impacts will be minimized with engineering measures as detailed in the EIA that will be applied during road works and by adopting other appropriate environmental and social mitigation measures during

implementation as well as operation of the project. Moreover, this area has been in need of a decent road for decades, and has great potential not only in social & economic development, but also for potential tourism development along the road.

It can therefore be concluded that there are no severe environmental impacts or other grounds that will prevent the road project from proceeding to its implementation provided that the recommended reinforcement and mitigation measures shown in this document are strictly adhered by all concerned bodies.

To maximise the efficiency of the road project and reduce the magnitude of the unwanted effects to acceptable levels, it is essential that the mitigation measures are applied at the right time through the environmental management plan, and by incorporating the relevant ones in the engineering design for implementation. A close follow-up of the effectiveness of the implemented measures through a well-planned monitoring programme by the supervision consultant and by the Environmental Monitoring and Safety Branch of the Ethiopian Roads Authority is of critical importance.

Public disclosure of the EIA Report has to be made to Project Affected Persons (PAPs) and other stakeholders for review and comments on before the project appraisal. The purpose of the disclosure is to receive comments and suggestions from PAPs and other stakeholders to incorporate the appropriate suggestions.

Figure 4.1 Alternatives Considered in the Feasibility and EIA Studies

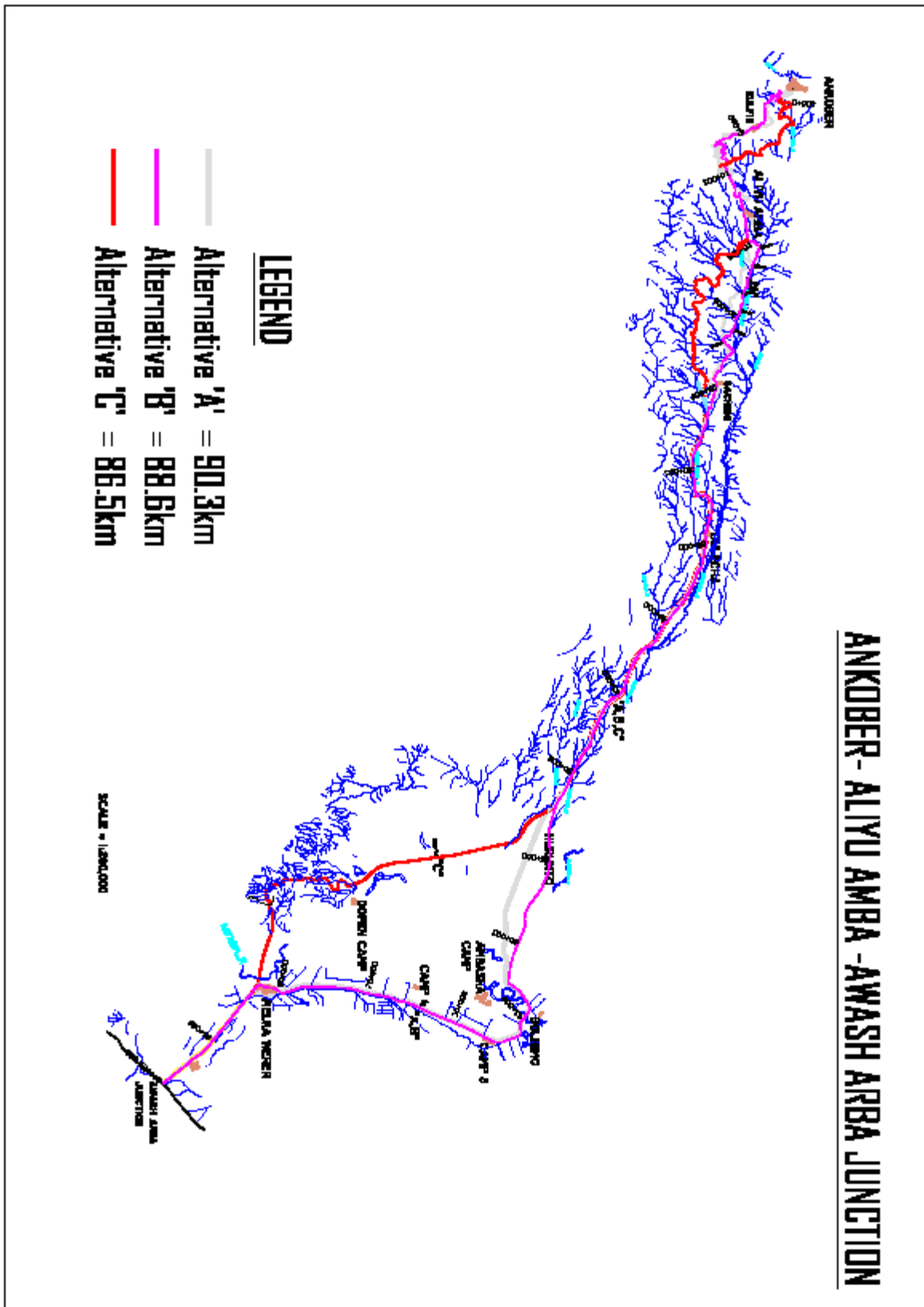


Figure 4.2: Conservation Areas and Paleontological Research Sites

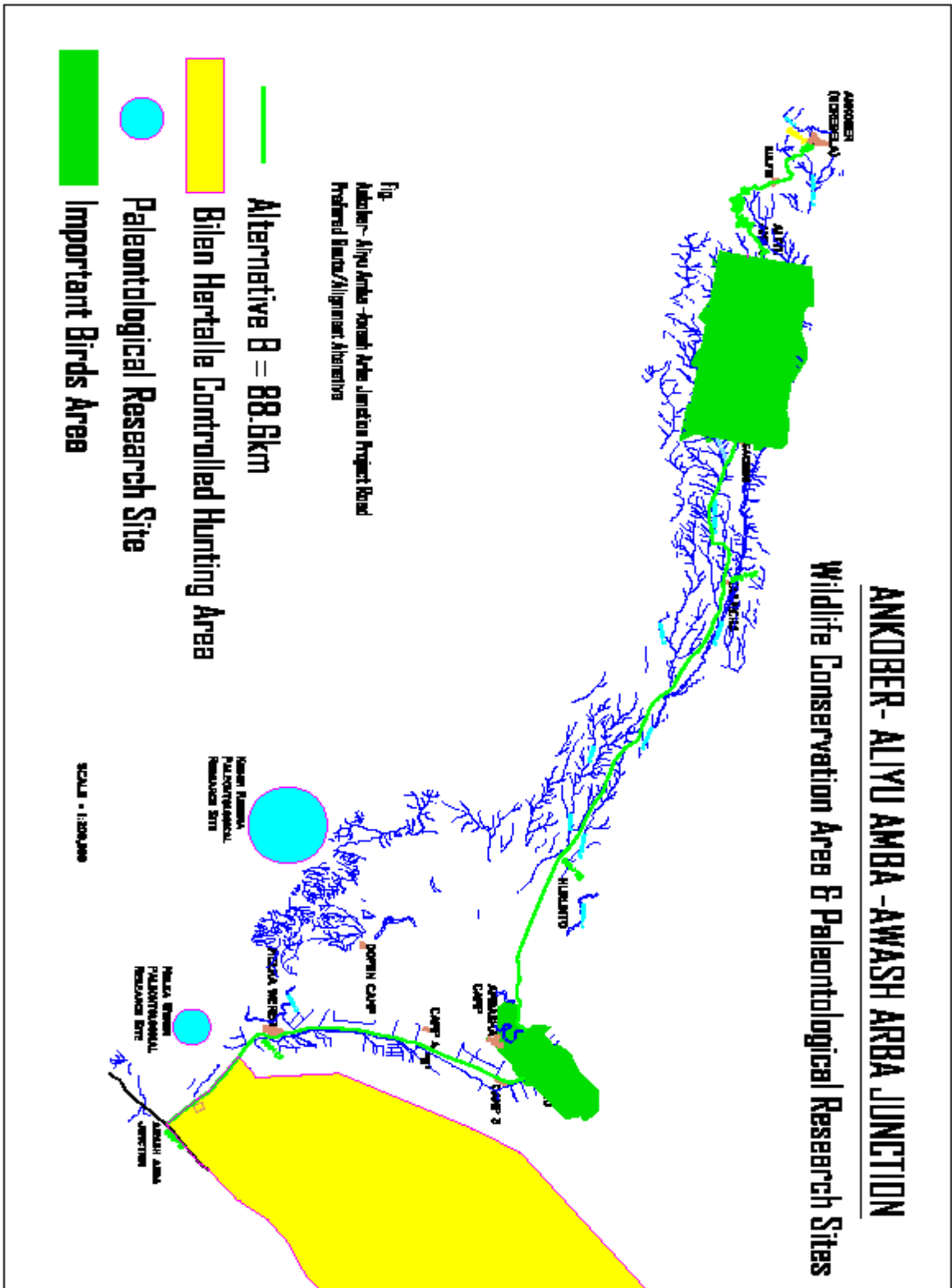
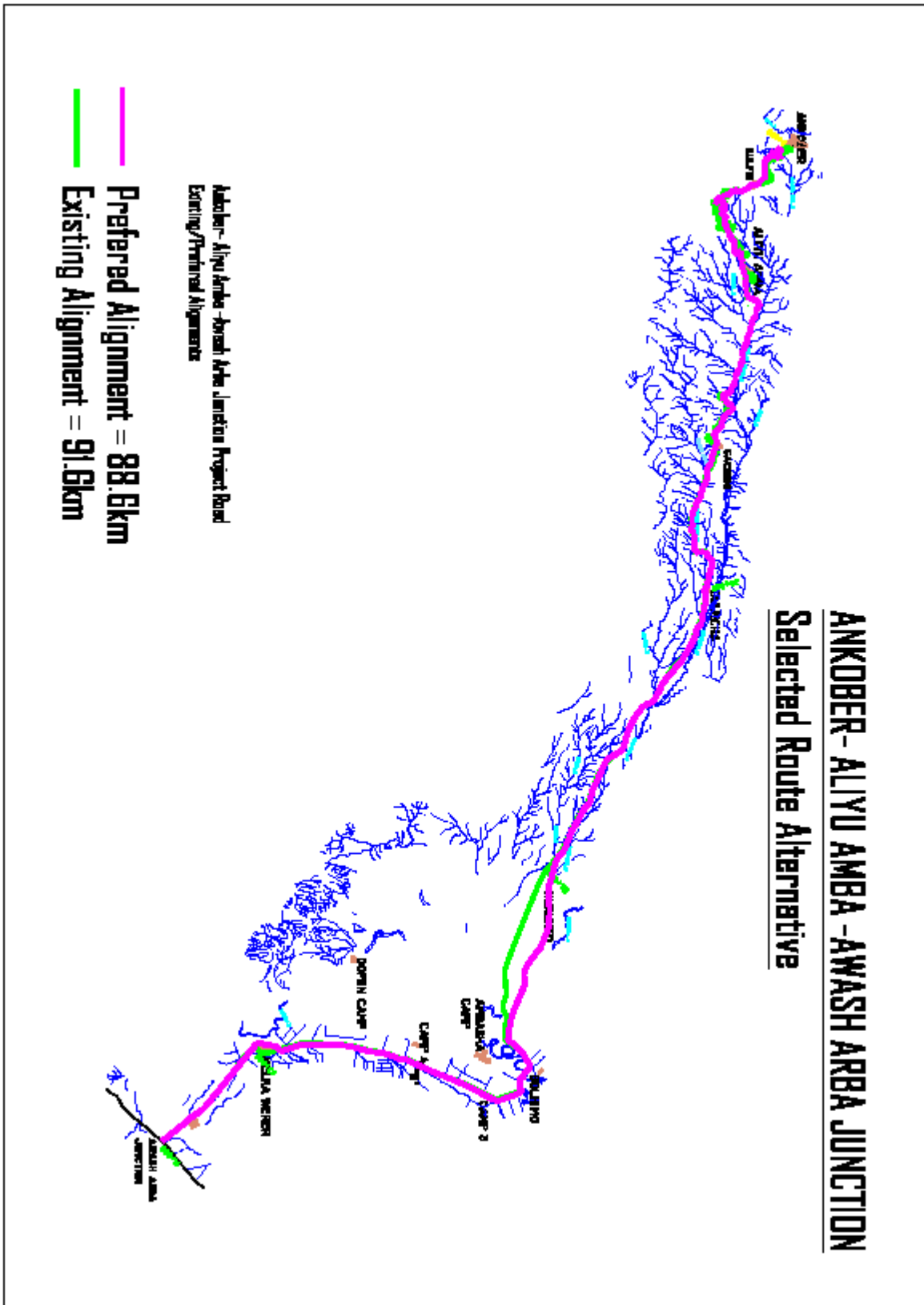


Figure 4.3: The Selected Route Alignment - Alternative B



Summary of the Revised Environmental Impact Assessment Reports for
APL IV Projects - Re-Disclosure 12 March 2009

No	Description of Activities	Project Road		
		Ankober-AliyuAmba-Dulecha-AwashArba	Mekenajo-Demidolo	Welikite-Hosaina
		Cost Estimate		
1.	Tree Planting and Management	1,200,000.00	900,000.00	1,500,000.00
2.	HIV/AIDS program Implementation Awareness creation and availing Condoms.	500,000.00	1,700,000.00	1,250,000.00
3.	Short term Training of Environmental Management Expert of ERA,s EMSB	300,000.00	500,000.00	-
4.	Routine monitoring and field visit expenses including allowance for EMSB, EPA & EWDC staff local experts.	200,000.00	-	-
5.	Relocation of Grave Yards	-	-	232,600.00
6.	Awareness Workshop or training /orientation for woreda /zone environment experts and short term training for excavators on PCR artifact recognition.	120,000.00	660,000.00	105,000.00
7.	others	*	*	*
Original EIMC in EIA with 15% Contingency		5,000,000.00	5,577,000.00	3,550,740.00
Grand Total EIMC For All Projects		14,127,740.00		

* - Shows other impact mitigation costs which are not indicated